

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
15 January 2004 (15.01.2004)

PCT

(10) International Publication Number
WO 2004/005906 A1

(51) International Patent Classification⁷: **G01N 23/223**

(21) International Application Number:
PCT/IT2003/000404

(22) International Filing Date: 27 June 2003 (27.06.2003)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:
TO2002A000575 2 July 2002 (02.07.2002) IT

(71) Applicants (for all designated States except US): **ENTE PER LE NUOVE TECNOLOGIE, L'ENERGIA E L'AMBIENTE (ENEA)** [IT/IT]; Lungotevere Thaon di Revel, 76, I-00196 Roma (IT). **FIN TECH S.R.L.** [IT/IT]; Via Milazzo, 8, I-33100 Udine (IT).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BALDACCHINI, Giuseppe** [IT/IT]; Via G. Quattrucci, 246, I-00046 Grottaferrata (IT). **MONTEREALI, Rosa, Maria** [IT/IT]; Via A. Cassani, 39, I-00046 Grottaferrata (IT). **BONFIGLI,**

Francesca [IT/IT]; Via Delle Tirimere, 12, I-00121 Ostia Lido (IT). **FLORA, Francesco** [IT/IT]; Via Fosso del Portone, 6, I-00040 Montecompatri (IT). **PACE, Angelo** [IT/IT]; Via Donatello, 3, I-00034 Colleferro (IT). **FAENOV, Anatoly, Yakovlevich** [RU/RU]; Leningradsky pr. 74-6-33, Moscow (RU). **PIKUZ, Tatiana** [RU/RU]; Akademika Anohina St. 2, 38-3-452, Moscow (RU). **REALE, Lucia** [IT/IT]; Via Vicinale San Marco, 2, I-00040 Monteporzio Catone (IT).

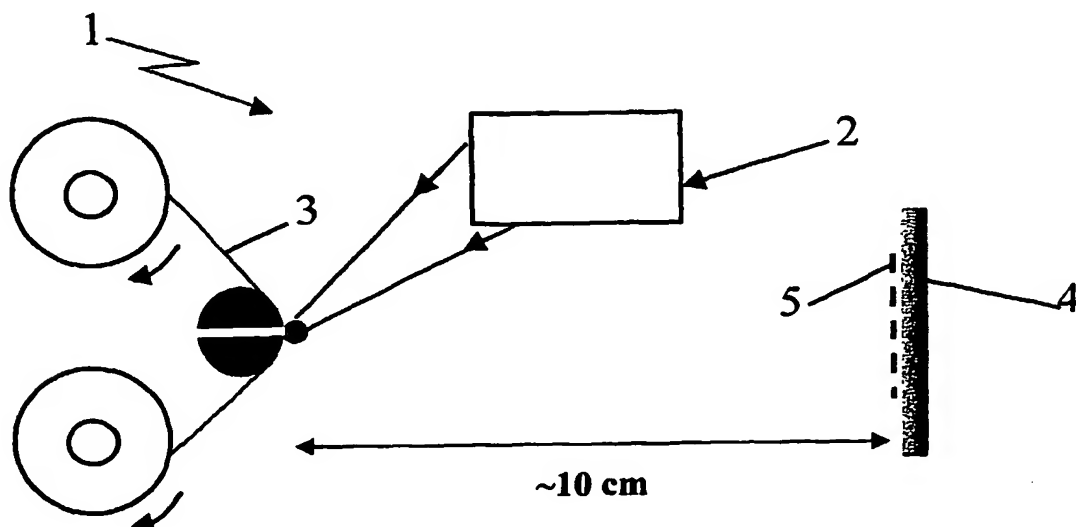
(74) Agents: **JORIO, Paolo** et al.; c/o Studio Torta S.r.l., Via Viotti, 9, I-10121 Torino (IT).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: A METHOD FOR DETECTION OF MICROMETRIC AND SUB-MICROMETRIC IMAGES BY MEANS OF IRRADIATION OF A MASK OR OF A BIOLOGICAL SPECIMEN WITH IONIZING RADIATION



(57) Abstract: Described herein is a method for detection of micrometric and sub-micrometric images with high resolution and high dynamics of contrast, and suited for enabling microradiography, x-ray microscopy and the production of coloured configurations in dielectric materials. The method consists of radiation of energy comprised between 20 and 2000 eV for irradiating a mask or a biological specimen and use of a detector consisting of LiF in the form of a crystal or a film. The power of the radiation released in the LiF detector during exposure is preferably $\geq 10\text{mW/cm}^2$.



ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY,*

BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No. ...

PCT/IT 03/00404

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01N23/223

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 577 092 A (RICHARDSON MARTIN C ET AL) 19 November 1996 (1996-11-19) abstract column 4, line 41 -column 5, line 25; figure 1	1-11
A	US 5 044 001 A (WANG CHIA-GEE) 27 August 1991 (1991-08-27) column 2, line 30 - line 56; figure 1	1-11
A	US 5 391 879 A (MORRONE LUCIANO W ET AL) 21 February 1995 (1995-02-21) abstract column 6, line 23 - line 26; figure 1	1-11
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

27 October 2003

Date of mailing of the international search report

03/11/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Kempf, G

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IT 03/00404

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 2001/006214 A1 (BOERNER ET AL) 5 July 2001 (2001-07-05) abstract; table 1 page 1, paragraph 18 -----</p>	1-11

INTERNATIONAL SEARCH REPORT

International Application No ...
PCT/IT 03/00404

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5577092	A	19-11-1996	NONE	
US 5044001	A	27-08-1991	EP JP	0319912 A2 2138856 A
US 5391879	A	21-02-1995	CA EP JP KR	2134313 A1 0654683 A2 7198852 A 164246 B1
US 2001006214	A1	05-07-2001	DE... EP JP	19961673 A1 1111405 A2 2001228254 A
				28-06-2001 27-06-2001 24-08-2001